

REMARKS

Favorable reconsideration of this application is respectfully requested.

Claims 18-21, 24, 25, 27-31, 34, 35, and 37 are presently active in this application. Claims 1-17 were previously canceled and Claims 22, 23, 26, 32, 33, and 36 are presently canceled without prejudice or disclaimer. Claims 18 has been amended to correct the formal matter noted in the objection thereto in the outstanding Action and to contain the limitations of canceled Claims 22, 23, and 26 to effectively rewrite Claim 26 in independent form. Similarly, Claim 28 has been amended to contain the limitations of canceled Claims 32, 33, and 36 to effectively rewrite Claim 26 in independent form. Clearly, none of the amendments that correct the noted deficiency in Claim 18 and effectively rewrite Claims 26 and 36 in independent form involves the introduction of any new matter.

Furthermore, as the present claim amendments involve no new issues and require no new search because they effectively rewrite dependent Claims 26 and 36 in independent form and simplify issues by canceling Claims 22, 23, 26, 32, 33, and 36, entry of the present amendment is respectfully submitted to be in order.

The outstanding Action presented an objection to Claims 18-27 based upon the inadvertent error noted in Claim 18, a rejection under 35 U.S.C. § 103(a) of Claims 18, 19, 21, 22, 28, 29, 31, and 32 as being unpatentable over Sakai (U.S. Patent No. 6,409,838) in view of Hunter et al (U.S. Patent No. 6,151,446, Hunter), a rejection of Claims 20 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Sakai in view of Hunter in further view of van de Ven et al (U.S. Patent No. 5,620,525, van de Ven), a rejection of Claims 23 and 33 under 35 U.S.C. § 103(a) as being unpatentable over Sakai in view of Hunter in further view

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of Maeda et al (U.S. Patent No. 5,620,523, Maeda), and a rejection of Claims 23-27 and 33-37 under 35 U.S.C. § 103(a) as being unpatentable over Sakai in view of Hunter in further view of Kwag et al (U.S. Patent No. 6,402,849, Kwag).

Applicants acknowledge with gratitude the telephone discussion held with Examiner Lund on October 9, 2003, to clarify the reliance on col. 3, line 56-col. 4, line 4 of Hunter set forth at page 3 of the outstanding Action.

In this respect, Applicants' representative pointed out that col. 3, line 56-col. 4, line 4 of Hunter did not teach the specific limitations of independent Claim 18 as to the recited "driving and controlling section" that had "to drive and control the substrate holder, and cause the substrate holder to keep the substrate at three or more height positions relative to the hot plate" because these "three or more height positions" were not permitted to have just any arbitrary relationship with one another. Instead of these height positions having any arbitrary relationship, it was noted that independent Claim 18 recited that the positions have to include "at least an upper position where the substrate is loaded/unloaded to/from the substrate holder, a middle position where the substrate is maintained at rest to be pre-heated by heat from the hot plate at a first temperature below a temperature at which silylation of the surface of the resist film effectively occurs, and a lower position where the substrate is maintained at rest to be heated by heat from the hot plate at a second temperature higher than the first temperature" (emphasis added).

Similarly, Applicants' representative pointed out that independent Claim 28 required a driving and controlling section including "means for causing the substrate holder to maintain the substrate at an upper position having a first distance between the substrate and

the hot plate, the substrate being loaded/unloaded to/from the substrate holder at the upper position, means for causing the substrate holder maintain the substrate at a middle position having a second distance smaller than the first distance between the substrate and the hot plate, the substrate being heated by heat from the hot plate at a first temperature below the temperature at which silylation of the surface of the resist film can effectively proceed while stationary at the middle position, and means for causing the substrate holder to keep the substrate at a lower position having a third distance smaller than the second distance between the substrate and the hot plate, the substrate being heated by heat from the hot plate at a second temperature at least as high as the temperature at which silylation of the surface of the resist film can effectively proceed while stationary at the lower position” (emphasis added).

Consequently, Applicant’s representative questioned how the Hunter substrate lift pin assembly 36 that was described at col. 3, lines 59-62, to rise “up from beneath substrate 20” to lift “substrate 20 off of the robot arm” at the substrate unload position and to then raise it closer to the radiant heater 16 to occupy “a fixed position adjacent to radiant heat source 16 until the temperature of substrate 20 is within a desired temperature range,” see col. 3, line 67-col. 4, line 2, can be reasonably interpreted as teaching the claimed substrate loading/unloading “upper position” and the claimed substrate pre-heating “middle position.” Clearly, the “upper position” taught by Hunter is the preheating position where the substrate is fixed prior to lowering onto the supporting ring 18 at the lower position while the position where substrate loading takes place (by engagement of the lift pins of the lift pin assembly) is lower (closer to the support ring 18) than this upper preheating position. Thus, the Hunter substrate loading position is the Hunter “middle position” relative to a Hunter “upper

position,” where preheating is performed, and the Hunter “lower position” for the substrate on support ring 18.

While the Examiner acknowledged that no other teaching in Hunter was applicable to teaching the specifically claimed “upper position” and “middle position,” the need to consider the teachings of col. 33, line 55-col. 4, line 4, in light of these specific arguments existed. Accordingly, the present response has been filed to emphasize this clear deficiency as to Hunter teaching the specifically claimed “upper” loading position and “middle” preheating rest position, where the claimed “middle” preheating rest position is the one required by independent claims 18 and 28 to be closer to the “lower” rest position, which in Hunter is on the ring 18.

In addition to the above points discussed as to the clear misinterpretation of Hunter being sufficient to warrant the withdrawal of all of the outstanding prior art rejections relying on this misinterpretation of Hunter, it is further submitted that there is no teaching or suggestion in Hunter or Sakai of the claimed temperatures and their relationship to “silyation” and the features of the supply system supply holes now incorporated in to base independent Claims 18 and 28 from Claims 26 and 36.

Rather than presenting evidence of “silyation” being well known, page 3 of the outstanding Action merely improperly alleges this to be the case. Similarly, rather than supply evidence that the supply hole sizes of Claims 26 and 36 that have now been incorporated into Claims 18 and 28 would have been an obvious modification to incorporate into the relied upon references, page 7 of the outstanding action relies upon conjecture that the prior art contains a teaching that the claimed hole sizes will be useful to optimize flow

patterns in the chamber. However, unsupported conclusions cannot be substituted for actual evidence. See In re Lee, 61 USPQ2d 1430, 1435 (Fed. Cir. 2002) that emphasizes the need for the PTO to provide evidence, not mere unsupported opinion, as follows:

In finding relevant facts, in assessing the significance of the prior art, and in making the ultimate determination of the issue of obviousness, the examiner and the Board are presumed to act from this viewpoint [that of the person of ordinary skill in the art to which the subject matter pertains]. Thus when they rely on what they assert to be general knowledge to negate patentability, that knowledge must be articulated and placed on the record.

Furthermore, this supply hole arrangement and sizing relate to the claimed three or more height positions for the target substrate relative to the hot plate. Specifically, where the target substrate is in a floating state relative to the hot plate, exhaust performance between the target substrate and hot plate was determined by the Applicants to not be good. In this case, if nitrogen gas (which is used at the end of silylation reaction (see step S11 on page 12)), or a vapor containing a silylation reagent, is supplied from upper holes and lower holes at the same supply rate, the pressure balance in the process chamber deteriorates, thereby occasionally shifting the position of the target substrate. This causes a problem in handling the target substrate for the next processing step. Furthermore, silylation reagent supplied under the target substrate can increase waste of silylation reagent consumption. In conclusion, combining the subject matter of Claims 26 and 36 with that of Claims 18 and 28 greatly contributes to improvement of the silylation substrate treatment and the use of the three height positions as claimed.

Also missing from the record is any reason to select the radiant relatively high temperature thermal processing device of Hunter as a source of teachings to modify the Sakai

relatively low temperature aging unit of Fig. 5 that has heating plate 51. In this regard, the Sakai Fig. 5 aging unit is designed to heat a substrate using a heating plate to a much lower temperature (100° C, see col. 10, line 62, of Sakai) for a much different purpose as compared to the thermal processing purpose of Hunter with its much higher temperature (300-400° C, see col. 3, lines 57-58) radiant source preheating. Note In re Rouffet, 47 USPQ2d 1453, 1557 (Fed. Cir. 1998) explaining the need to show motivation as to reference selection for apparently disparate references, such as Hunter and Sakai here.

Clearly, nothing in either Sakai and/or Hunter suggests the Hunter problem of substrate warpage (and other undefined degradation) occurring with rapid substrate heating to over 300° C by placement on a preheated support (see Hunter at col. 3, lines 63-66) would be reasonably expected to be a problem experienced using the Sakai aging unit that includes heating plate 51 that is not disclosed or suggested to be preheated prior to introduction of the substrate. Instead, col. 10, line 62, of Sakai indicate that it is only after the loading of the substrate on the heating plate with evacuation through pipe 55 followed by ammonia introduction from 27 via pipe 54 (“[a]t this time”) that “the wafer W is heated to about 100° C.” Thus, the rapid heating caused by placement of a relatively cold wafer on a support already heated to over 300° C occurring with the Hunter radiant heated chamber would not be expected to be a problem with the aging unit of Fig. 5 of Sakai having the heat plate that is not heating anything until the wafer is already in place, and then only heating to a temperature 1/3 that of Hunter.

As none of Maeda, Kwag, or van de Ven, considered alone or together in any proper combination, cure the deficiencies noted above as to Hunter and/or Sakai, the outstanding 35


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U.S.C. §103 obviousness rejections based upon these references in combination with Sakai and Hunter are all traversed as also being clearly improper. Accordingly, withdrawal of these improper outstanding 35 U.S.C. §103 obviousness rejections is further respectfully submitted to be in order.

As no further issues are believed to be outstanding in this application, it is respectfully urged that this application is clearly in condition for formal allowance and an early and favorable action to that effect is, therefore, respectfully requested.

Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION: Takayuki TOSHIMA, et al.

SERIAL NO.: 09/713,247

GAU: 1763

FILED: November 16, 2000

EXAMINER: LUND, J.

FOR: SILYLATION TREATMENT UNIT AND METHOD

LETTER SUBMITTING DRAWING SHEET(S)

COMMISSIONER FOR PATENTS
Alexandria, VA 22313

SIR:

Responsive to the below indicated communication, the following drawing sheets are submitted herewith:

☒ 2 Replacement Drawing Sheets ☐ New Drawing Sheets

☒ Official Action dated 07/21/03

☐ Notice of Allowance/Issue Fee dated

☐ Other dated

The changes and/or modifications made include the following:

The attached sheets of drawings includes changes to Figs. 4 & 5

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